




## Running Water

Water from rainfall can hit Earth's surface and do a number of things:

1. Slowly soak into the ground: **Infiltration**.
2. Change to a gas: **Evaporation**.
3. Flow across Earth's surface: **Runoff**.

**Runoff:**  
 Water that runs or flows across Earth's surface under the force of gravity.  
 Runoff causes erosion!

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## What Affects Runoff and Erosion?

**The intensity and duration of rainfall.**   
*The harder and longer it rains, the more water that will flow on the surface.*

**The water content of the soil.**   
*Is the soil saturated, or can rainfall soak into it?*

**Slope of the land.**   
*Water flows fast down steep slopes which lead to more Erosional energy.*

**Vegetation.**   
*Vegetation can slow runoff and allow the surface water to soak in.*

Mr. Fetch's Earth Science Classroom

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## Running Water


If runoff does occur, it will occur in one of two ways:

1. **Sheet Flow**
2. **Rill Erosion**

**Sheet flow** is when water flows as a sheet across Earth's surface.



**Rill erosion** is when sheets of water collect and begin to flow and form a "channel" or gully.



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## Running Water

Over time, continuous rill erosion leads to the development of a stream.  
- A stream is any channelized flow of water.



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## Feeding a stream.

- All the water that drains into a large stream or river is known as a **drainage basin**.



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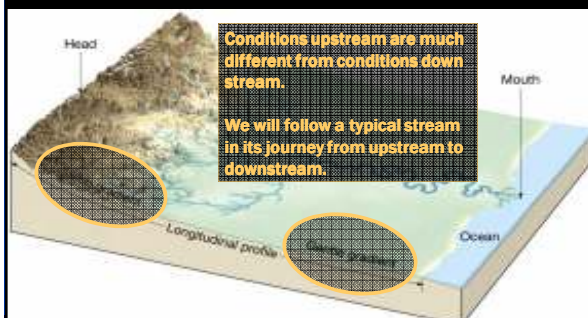
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## Stages of Development of a Stream

**Longitudinal Profile:**  
The Side-view of a stream from its head (start) to its mouth (end).



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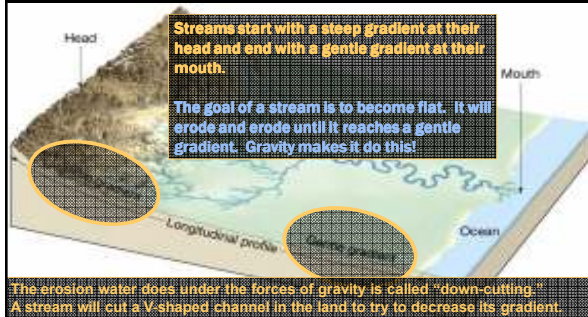
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## Stages of Development of a Stream

### Gradient:

The slope of a stream channel or the vertical drop over a certain distance.




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## Stages of Development of a Stream

### Stream characteristics UPSTREAM: YOUNG STREAMS

1. Steep gradient.
2. Steep gradients = fast-moving water.
3. Fast moving water = down-cutting and erosion.
4. Down-cutting = deep but narrow V-shaped channelized water.




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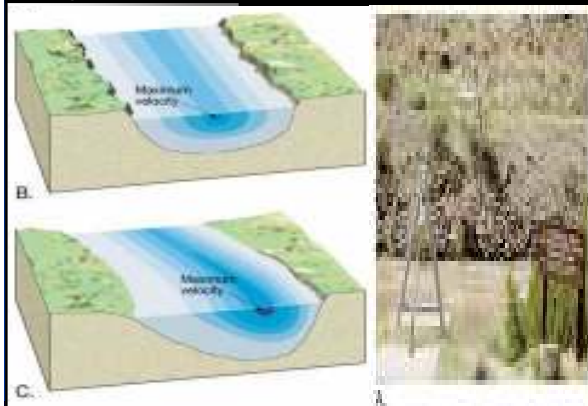
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## Stages of Development of a Stream




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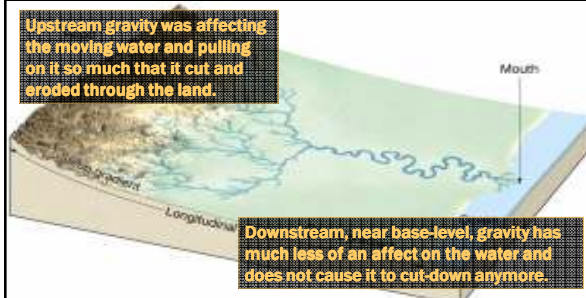
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### Stages of Development of a Stream

- As we move downstream, the gradient of a stream decreases.
- This is because the stream has downcut to near base-level.
- **Base-level:** lowest elevation a stream can erode its channel.
- At this point, gravity is no longer trying to bring the water down.




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### Stages of Development of a Stream

- Now, instead of down-cutting, downstream erosion occurs from side to side.**
- Moving water will erode side to side to form MEANDERS.
- Meanders are the curving, windy, path water takes downstream.
- A flood plain is created as meanders weave side to side over the land.
- A flood plain is the flat area land on either side of a meander.
- A flood plain is where a stream or river will "flood" during high waters.




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### Stages of Development of a Stream

#### Stream characteristics DOWNSTREAM: MATURE STREAM

1. Gentle gradient.
2. Gentle gradients = slow-moving water and less down-cutting.
3. Less down-cutting = most erosion is side to side forming meanders.
4. Meanders indicate a stream is nearing base-level (Mature).




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### The work of a stream: erosion.

- As a stream travels, it picks up and transports sediments.

The more water (high discharge) = the more erosion and transport.  
The faster water (high velocity) = the more erosion and transport.

There are three major types of sediment transport:

1. **Dissolved load:** Sediments dissolved in solution (salts).
2. **Suspended load:** Silts and clays held or suspended in the water.
3. **Bed load:** Sands and gravels rolling along the channel bottom.  
Sediments in bed load often move by saltation.



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### The work of a stream: erosion.

The most stream erosion occurs:

- On a steep gradient.
  - On the outside of a meander (called a Cutbank).
- The water is moving the fastest during each situation.



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### The work of a stream: deposition.

- As a stream travels, it also deposits its load of sediment.

The less water (low discharge) = the more deposition.  
The slower water (low velocity) = the more deposition.

There are three major locations for deposition:

1. **Inside of a meander:** Water moves the slowest. (Called point-bar).
2. **Delta:** Water slows to enter a river, lake, or ocean.  
The sediment is deposited in a fan-shape.
3. **Levees:** Deposited sediment on the banks of stream or rivers.  
During a flood, waters rise and recede.  
In the process they drop out sediment along the banks.



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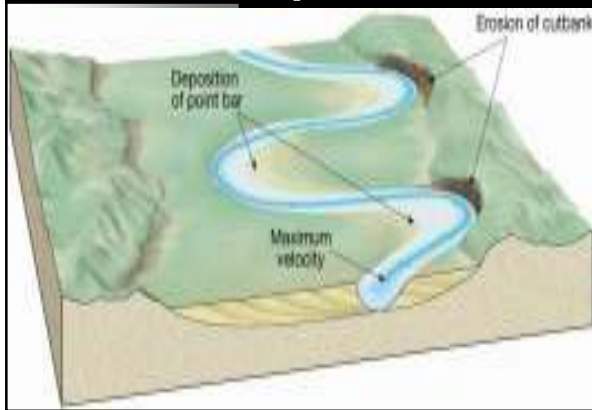
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**The work of a stream: deposition.**



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**The work of a stream: deposition.**



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**The work of a stream: deposition.**



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